adjustable precision voltage source

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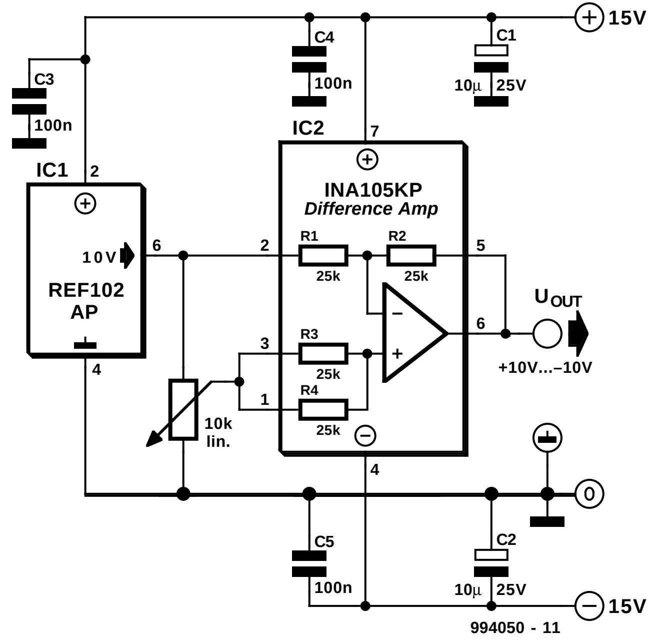

A Burr-Brown application

Many applications require a precision voltage source which can be adjusted through zero to both positive and negative output voltage. An example is a bipolar power supply. Perhaps the most obvious implementation of a bipolar voltage source would be to use a bipolar voltage reference. However, a simpler solution is to use a single voltage reference and a precision unity-gain inverting amplifier. If a precision difference amplifier is used for the unity-gain inverting amplifier, the circuit requires just two chips and a potentiometer.

In the present circuit a Type INA105 differential amplifier is used as the unity-gain amplifier. A potentiometer is connected between the input and ground. The slider of the potentiometer is connected to the non-inverting input of the unity-gain amplifier. (The non-inverting input of a unity-gain amplifier is normally connected to ground.) With the slider at the bottom of the potentiometer, the circuit is a normal precision unity-gain inverting amplifier with a gain of –1.0 V/V ±0.01% max. With the slider at the top of the potentiometer, the circuit is a normal precision voltage follower with a gain of +1.0 V/V ±0.001% max. With the slider at the centre of its travel, there is equal positive and negative gain for a net gain of 0 V/V. The accuracy between –1.0 V/V and +1.0 V/V is normally limited by the accuracy of the potentiometer. Precision 10-turn potentiometers are available with 0.01% linearity.

The –1.0 V/V to +1.0 V/V linear gain control amplifier has many applications. With the addition of a precision +10.0 V reference, it becomes a –10 V to +10 V adjustable precision voltage source.

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